

Applicant: Petrovich et al.
For: SENSOR READOUT CIRCUIT

1 1. A sensor readout circuit which provides a frequency signal output, the
2 readout circuit comprising:
3 a phase detector circuit responsive to an output signal from a sensor and
4 an input signal to the sensor and configured to detect the phase difference between the
5 input signal and the output signal; and
6 a drive circuit responsive to the phase detector circuit and configured to
7 maintain a fixed phase difference between the input signal and the output signal.

1 2. The sensor readout circuit of claim 1 in which the fixed phase difference
2 between the input signal and the output signal is maintained at zero degrees by the drive
3 circuit.

1 3. The sensor readout circuit of claim 1 in which the fixed phase difference
2 between the input signal and the output signal is maintained at 90° by the drive circuit.

1 4. The sensor readout circuit of claim 1 in which the fixed phase difference
2 between the input signal and the output signal is maintained at 180° by the drive circuit.

1 5. The sensor readout circuit of claim 1 in which the fixed phase difference
2 between the input signal and the output signal is maintained at 270° by the drive circuit.

1 6. The sensor readout circuit of claim 1 in which the fixed phase difference
2 between the input signal and the output signal is maintained at a fixed phase difference
3 between 0° and 360° by the drive circuit.

1 7. The sensor readout circuit of claim 1 further including a phase delay
2 adjustment circuit responsive to the input signal and the phase detection circuit for
3 adjusting the phase difference between the input signal and the output signal.

1 8. The sensor readout circuit of claim 1 in which the output signal is a
2 sinusoidal voltage at a predetermined frequency.

1 9. The sensor readout circuit of claim 8 in which the predetermined
2 frequency is in the range of 10 MHz to 30 MHz.

1 10. The sensor readout circuit of claim 8 further including a voltage step
2 module configured to offset the input voltage by a predetermined amount to offset the
3 frequency and measure the corresponding phase detector circuit output change.

1 11. The sensor readout circuit of claim 10 in which input voltage is offset 90°.

1 12. The sensor readout circuit of claim 10 in which input voltage is offset
2 180°.

1 13. The sensor readout circuit of claim 10 in which input voltage is offset
2 270°.

1 14. The circuit of claim 9 in which the Q is calculated from the ratio of the
2 offset of the voltage and the offset of the frequency.

1 15. The sensor readout circuit of claim 1 in which the sensor is a flexure plate
2 wave device.

1 16. The sensor readout circuit of claim 1 in which the sensor readout circuit
2 continuously outputs a frequency representing the resonance frequency of the sensor.

1 17. A sensor readout circuit which provides a frequency signal output, the
2 readout circuit comprising:
3 a phase detector circuit responsive to an output signal from a sensor and
4 an input signal to the sensor and configured to detect the phase difference between the
5 input signal and the output signal;
6 a drive circuit responsive to the phase detector circuit and configured to
7 maintain a fixed phase difference between the input signal and the output signal; and
8 a phase delay adjustment circuit responsive to the input signal and
9 the phase detection circuit for adjusting the phase difference.

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1 18. A sensor readout circuit which provides a frequency signal output, the
2 readout circuit comprising:
3 a phase detector circuit responsive to an output signal from a sensor and
4 an input signal to the sensor and configured to detect the phase difference between the
5 input signal and the output signal; and
6 a drive circuit responsive to the phase detector circuit and configured to
7 maintain a fixed phase difference between the input signal and the output signal; and
8 a voltage step module configured to offset the voltage by a predetermined
9 amount to offset the frequency and measure the corresponding phase detector circuit
10 output change.

1 19. The circuit of claim 18 in which the Q is calculated from the ratio of the
2 offset of the voltage and the offset of the frequency.

20. A sensor readout circuit which provides a frequency signal output, the readout circuit comprising:

- a phase detector circuit responsive to an output signal from a sensor and an input signal to the sensor and configured to detect the phase difference between the input signal and the output signal;
- a drive circuit responsive to the phase detector circuit and configured to maintain a fixed phase difference between the input signal and the output signal;
- a phase delay adjustment circuit responsive to the input signal and the phase detection circuit for adjusting the phase difference; and
- a voltage step module configured to offset the voltage by a predetermined amount to offset the frequency and measure the corresponding phase detector circuit output change.

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1 21. A sensor readout circuit which provides a frequency signal output, the
2 readout circuit comprising:
3 a phase detector circuit responsive to an output signal from a flexure plate
4 wave device and an input signal to the flexure plate wave device and configured to detect
5 the phase difference between the input signal and the output signal; and
6 a drive circuit responsive to the phase detector circuit and configured to
7 maintain a fixed phase difference between the input signal and the output signal.

1 22. The sensor readout circuit of claim 21 in which the fixed phase difference
2 between the input signal and the output signal is maintained at zero degrees by the drive
3 circuit.

1 23. The sensor readout circuit of claim 21 in which the fixed phase difference
2 between the input signal and the output signal is maintained at 90° by the drive circuit.

1 24. The sensor readout circuit of claim 21 in which the fixed phase difference
2 between the input signal and the output signal is maintained at 180° by the drive circuit.

1 25. The sensor readout circuit of claim 21 in which the fixed phase difference
2 between the input signal and the output signal is maintained at 270° by the drive circuit.

1 26. The sensor readout circuit of claim 21 in which the fixed phase difference
2 between the input signal and the output signal is maintained at a fixed phase difference
3 between 0° and 360° by the drive circuit.

1 27. The sensor readout circuit of claim 21 further including a phase delay
2 adjustment circuit responsive to the input signal and the phase detection circuit for
3 adjusting the phase difference.

1 28. The sensor readout circuit of claim 21 in which the output signal is a
2 sinusoidal voltage at a predetermined frequency.

1 29. The circuit of claim 24 further including a voltage step module configured
2 to offset the voltage by a predetermined amount to offset the frequency and measure the
3 corresponding phase detector circuit output change.

1 30. The sensor readout circuit of claim 21 in which the sensor readout circuit
2 continuously outputs a frequency representing the resonance frequency of the flexure
3 plate wave device.

1 31. A method for determining the frequency signal output of a sensor, the
2 method comprising the steps of:
3 detecting the phase difference between an output signal from a sensor and
4 an input signal to a sensor; and
5 maintaining a fixed phase difference between the input signal and the
6 output signal.

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1 32. A method for determining the frequency signal output of a sensor, the
2 method comprising:
3 detecting the phase difference between an output signal from a sensor and
4 an input signal to a sensor;
5 maintaining a fixed phase difference between the input signal and the
6 output signal; and
7 adjusting the phase difference between the input signal and the output
8 signal to a predetermined fixed phase difference.

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